

US009896034B2

(12) **United States Patent**
Ward et al.

(10) **Patent No.:** **US 9,896,034 B2**
(45) **Date of Patent:** **Feb. 20, 2018**

(54) **CARGO ACCESSORY MODULAR ADAPTER**

(71) Applicant: **Cequent Performance Products, Inc.**,
Plymouth, MI (US)

(72) Inventors: **Brian Wayne Ward**, Swartz Creek, MI
(US); **Gail Rae Matheus**, Salem, MI
(US); **Sean Michael Phillips**,
Huntsville (CA)

(73) Assignee: **HORIZON GLOBAL AMERICAS**
INC., Plymouth, MI (US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/826,462**

(22) Filed: **Mar. 14, 2013**

(65) **Prior Publication Data**

US 2013/0193175 A1 Aug. 1, 2013

Related U.S. Application Data

(63) Continuation-in-part of application No.
PCT/US2012/049521, filed on Aug. 3, 2012.

(60) Provisional application No. 61/515,693, filed on Aug.
5, 2011.

(51) **Int. Cl.**
B60R 9/10 (2006.01)
B60R 9/04 (2006.01)
B60R 9/045 (2006.01)
B60R 9/00 (2006.01)

(52) **U.S. Cl.**
CPC **B60R 9/04** (2013.01); **B60R 9/00**
(2013.01); **B60R 9/045** (2013.01); **B60R 9/10**
(2013.01)

(58) **Field of Classification Search**
CPC .. B60R 9/10; B60R 9/058; B60R 9/04; B60R

9/00; B60R 9/042; B60R 9/0423; B60R
9/0426; B60R 9/045; B60R 9/048; B60R
9/0485; B60R 9/05; B60R 9/052; B60R
9/055; B60R 9/08

USPC 224/319, 321-326, 309; 248/228.3,
248/231.41, 229.12, 229.22, 230.3
See application file for complete search history.

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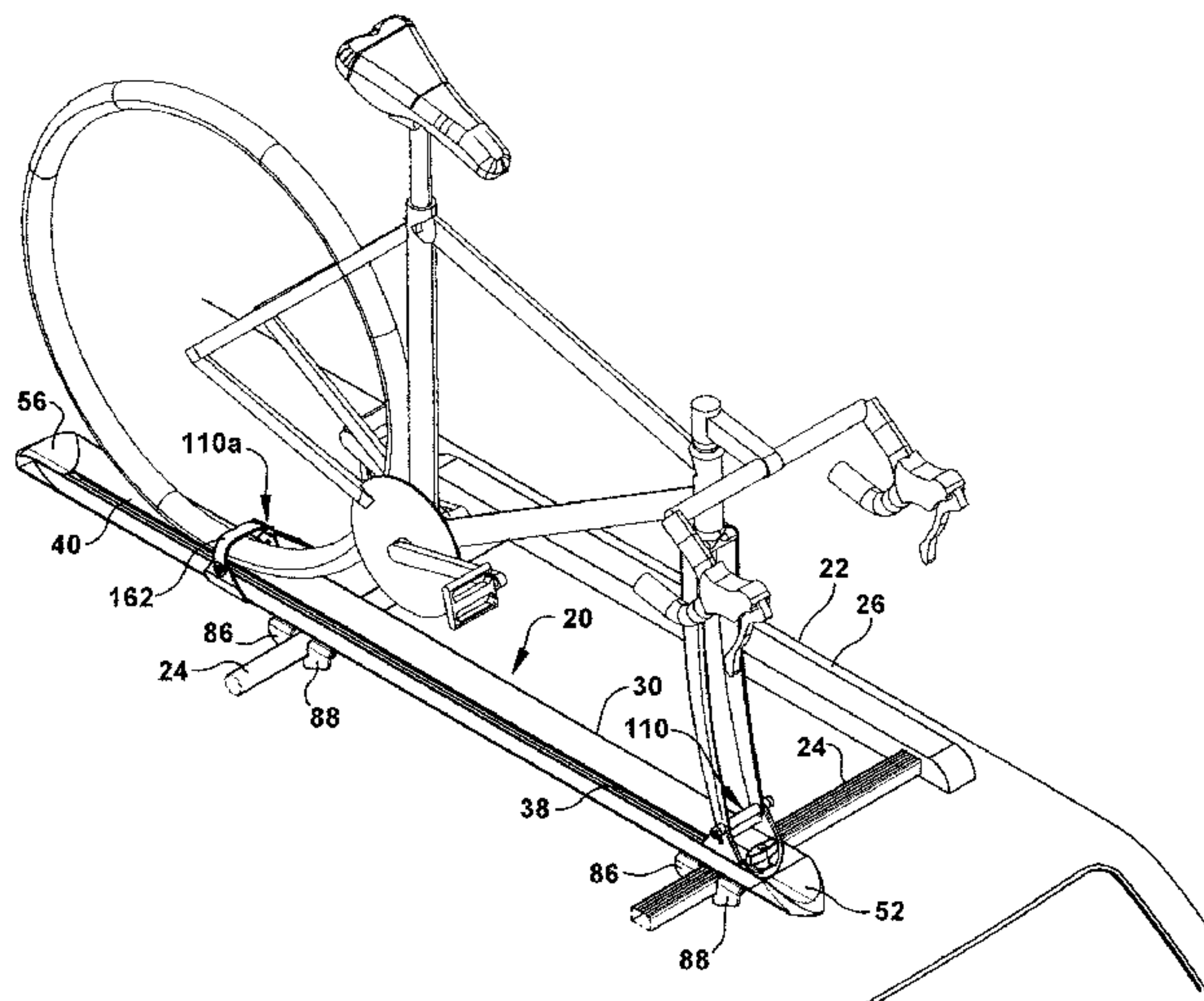
Primary Examiner — Scott McNurlen

(74) *Attorney, Agent, or Firm* — McDonald Hopkins LLC

(57) **ABSTRACT**

A cargo mounting system is shown and described. The cargo mounting system may include a rail having first and second portions and a length, the first portion being opposite the second portion, a first engaging member positioned on the first portion of the rail, and a second engaging member positioned on the second portion of the rail. The cargo mounting system may also include at least one vehicle attaching member selectively attached to and positionable on the second engaging member of the rail, the at least one vehicle attaching member selectively attachable to a vehicle, and at least one accessory mounting member selectively attached to and positionable on at least one of the first and second engaging members, where the at least one accessory mounting member is capable of carrying an item.

14 Claims, 10 Drawing Sheets



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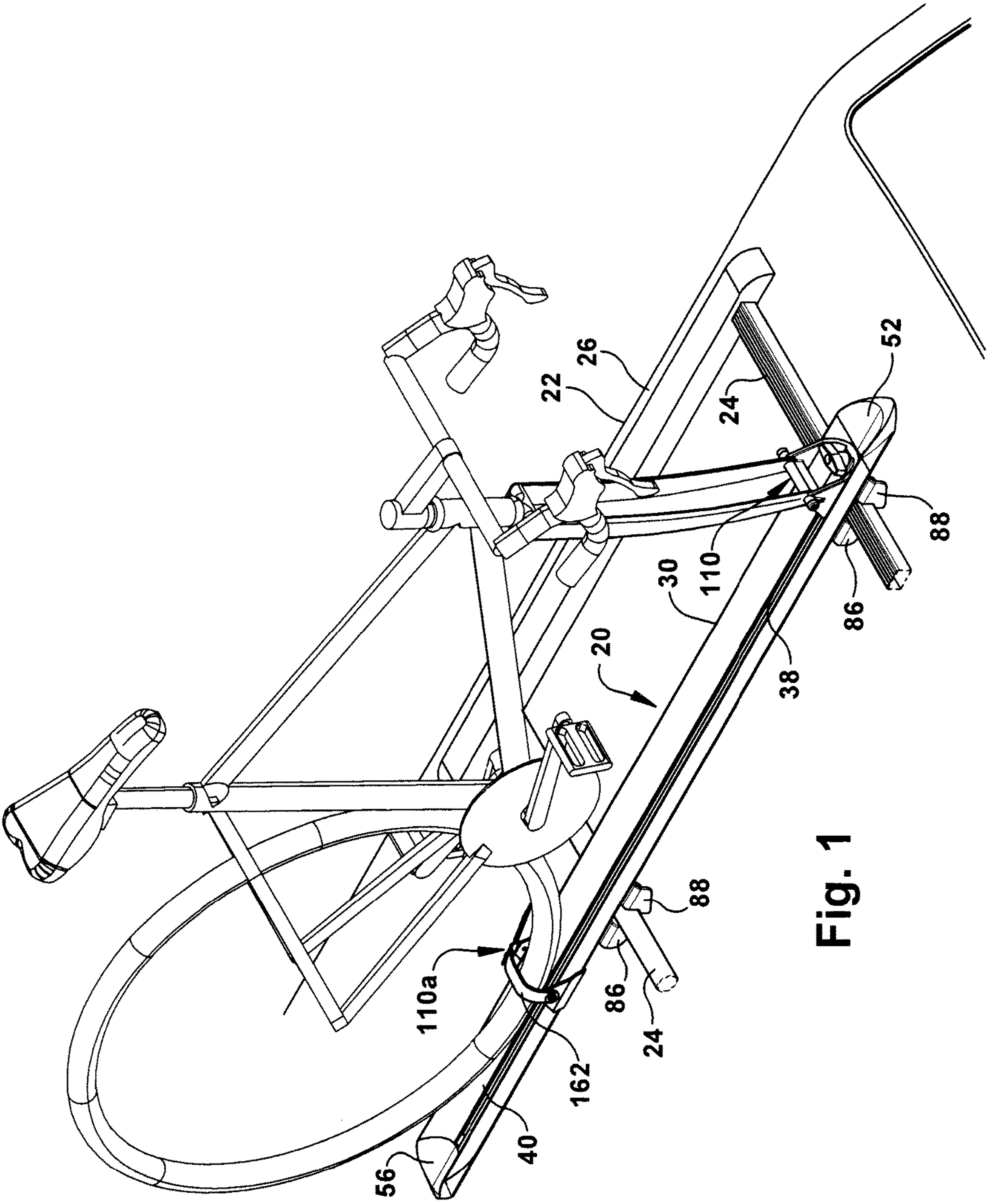


Fig. 1

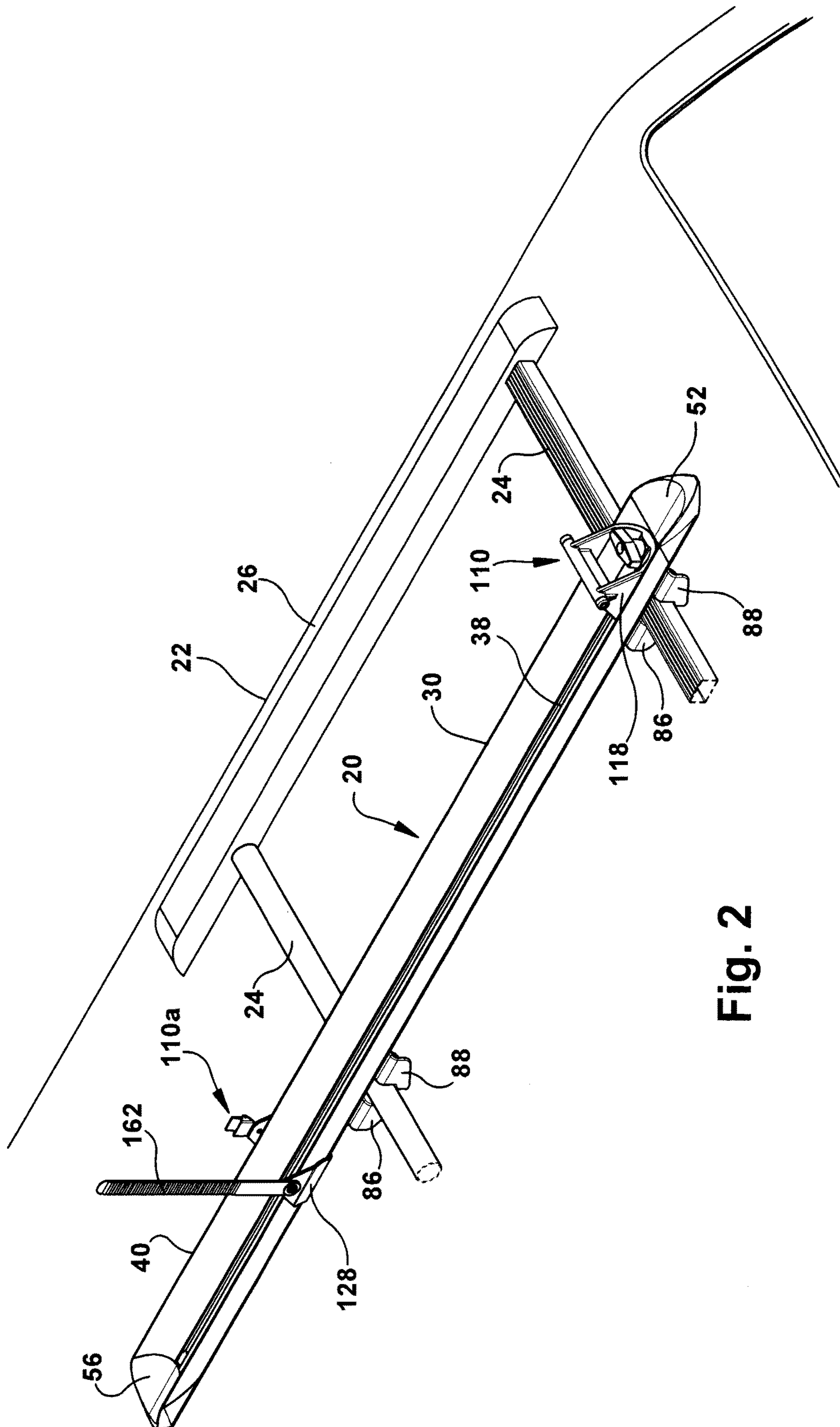
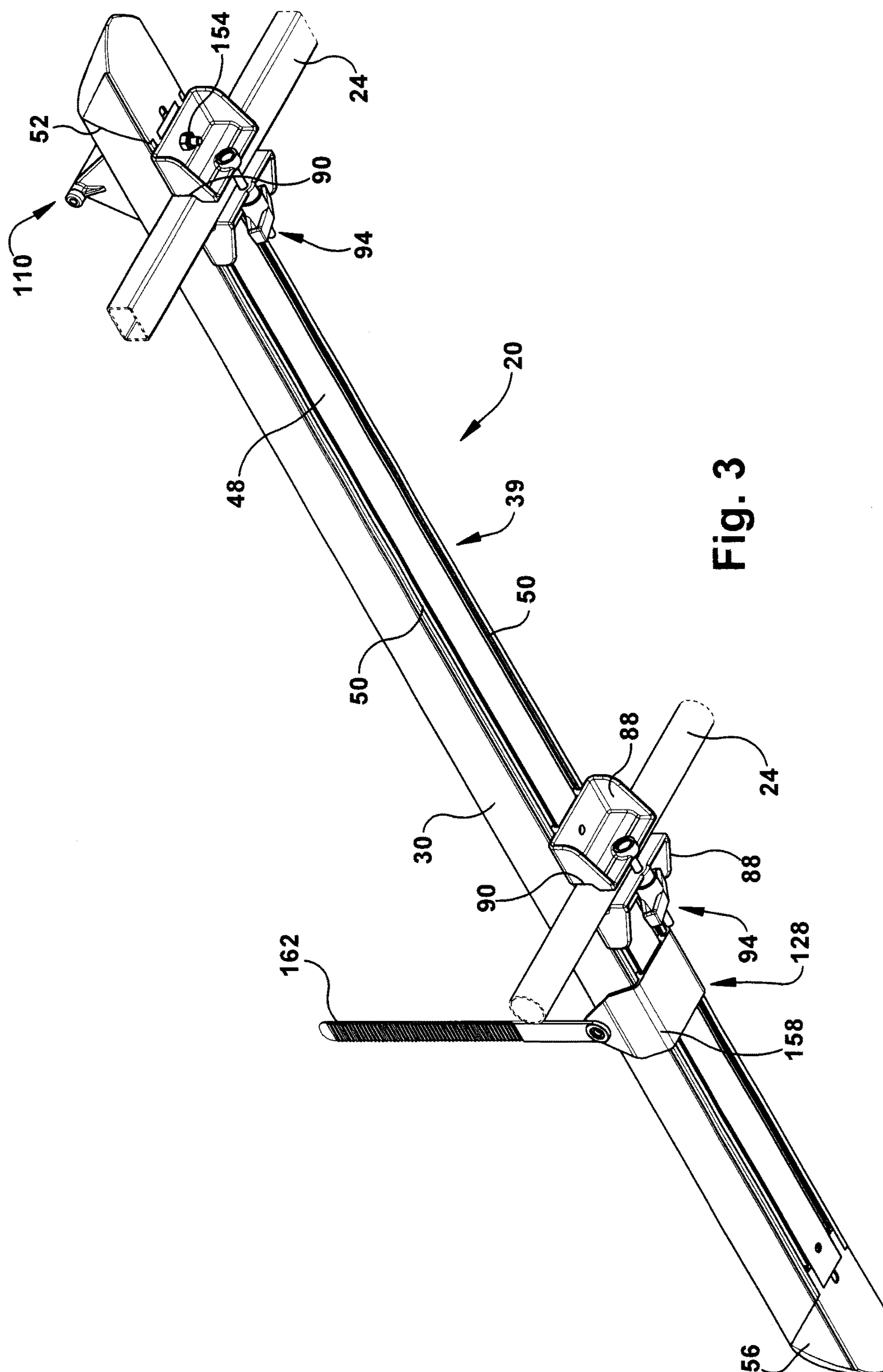


Fig. 2



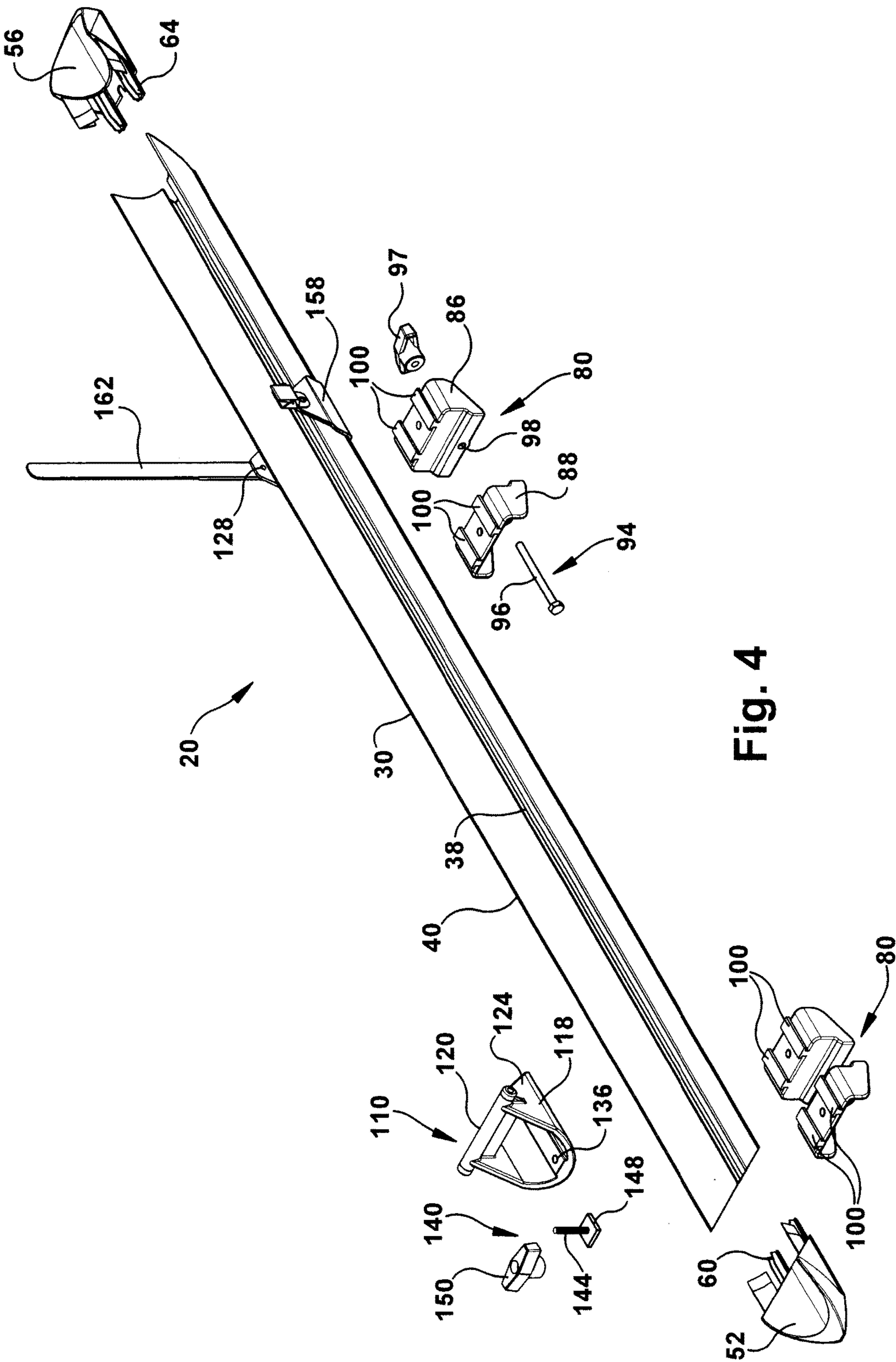
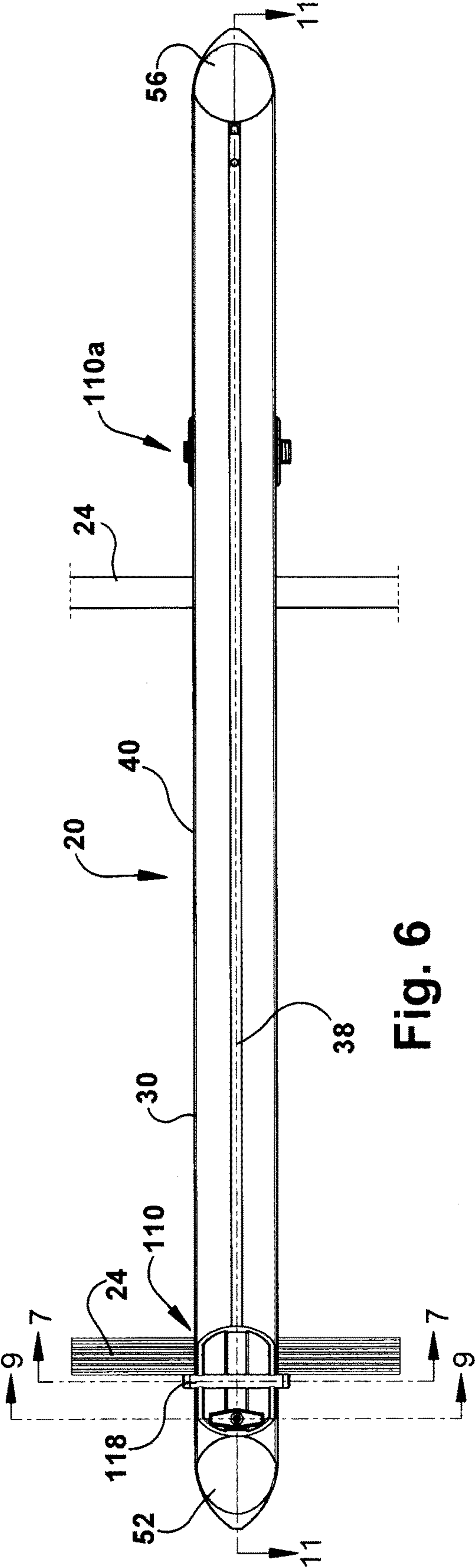
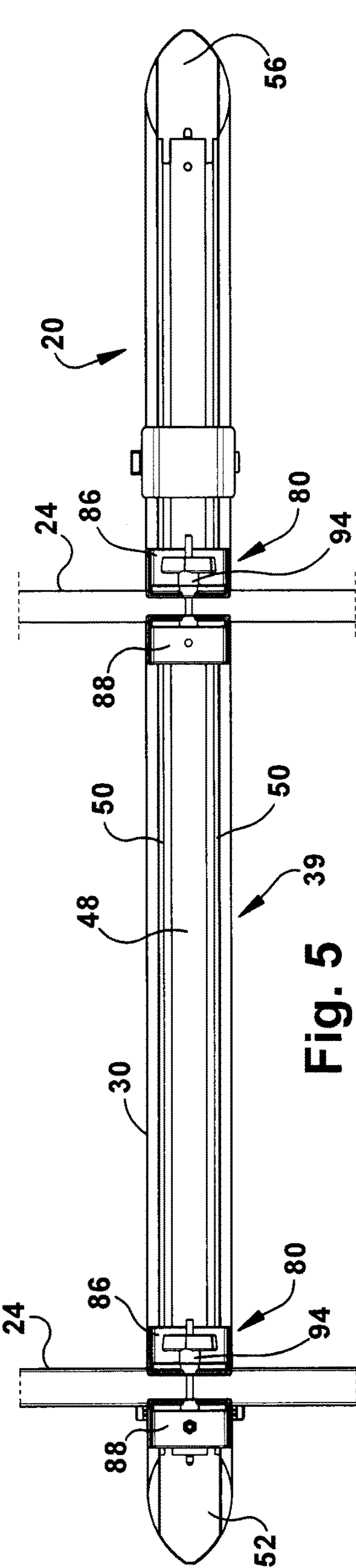
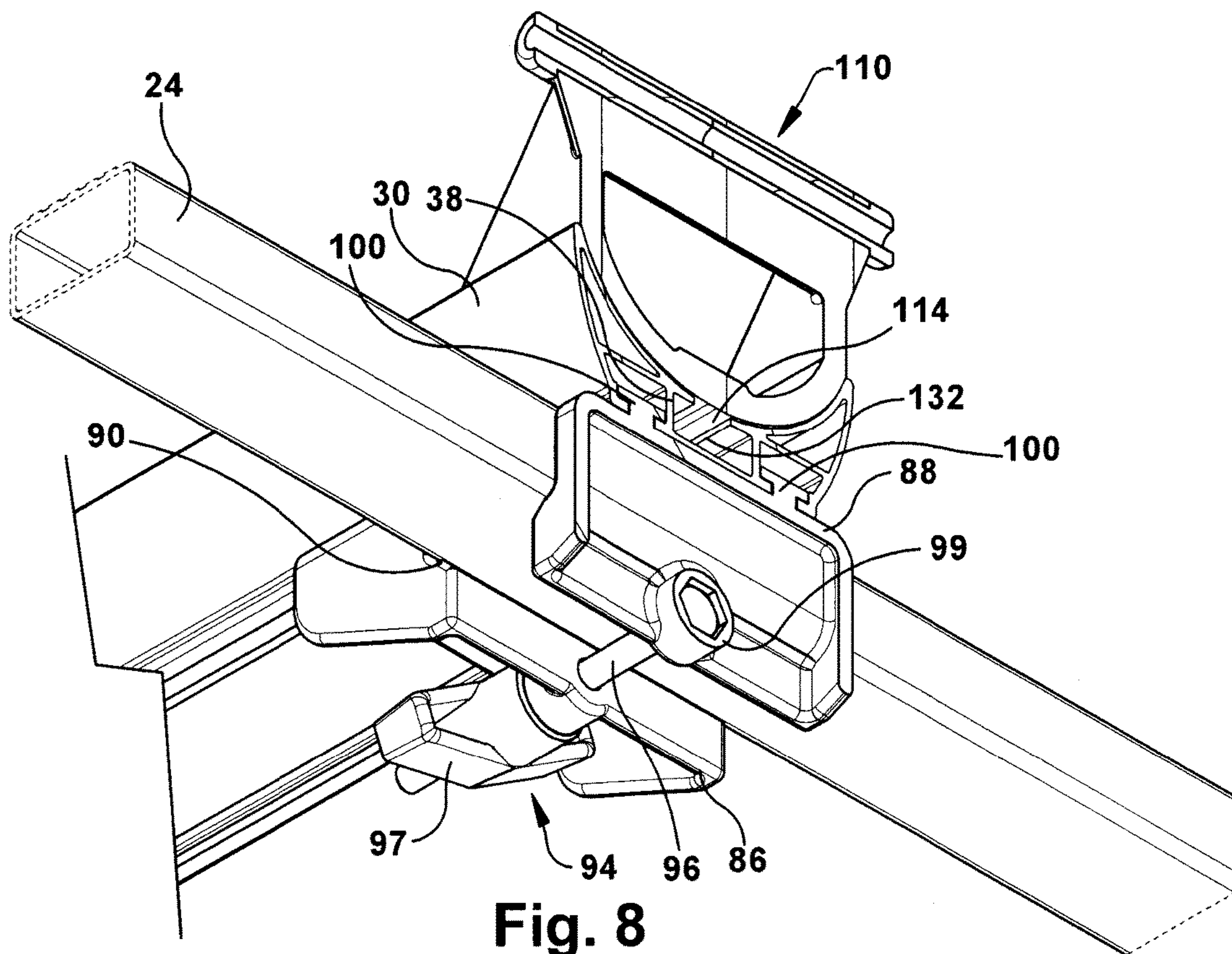
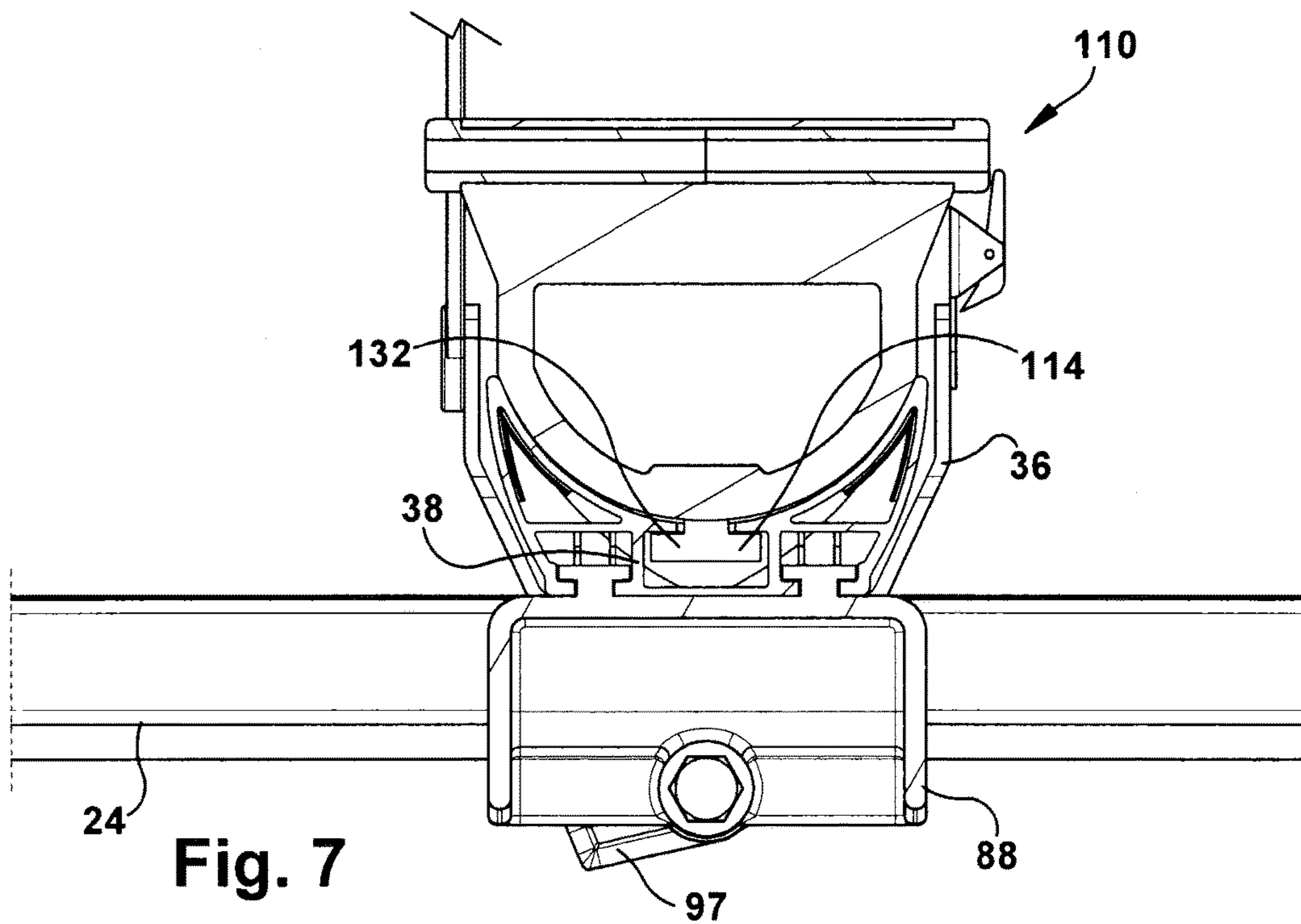


Fig. 4





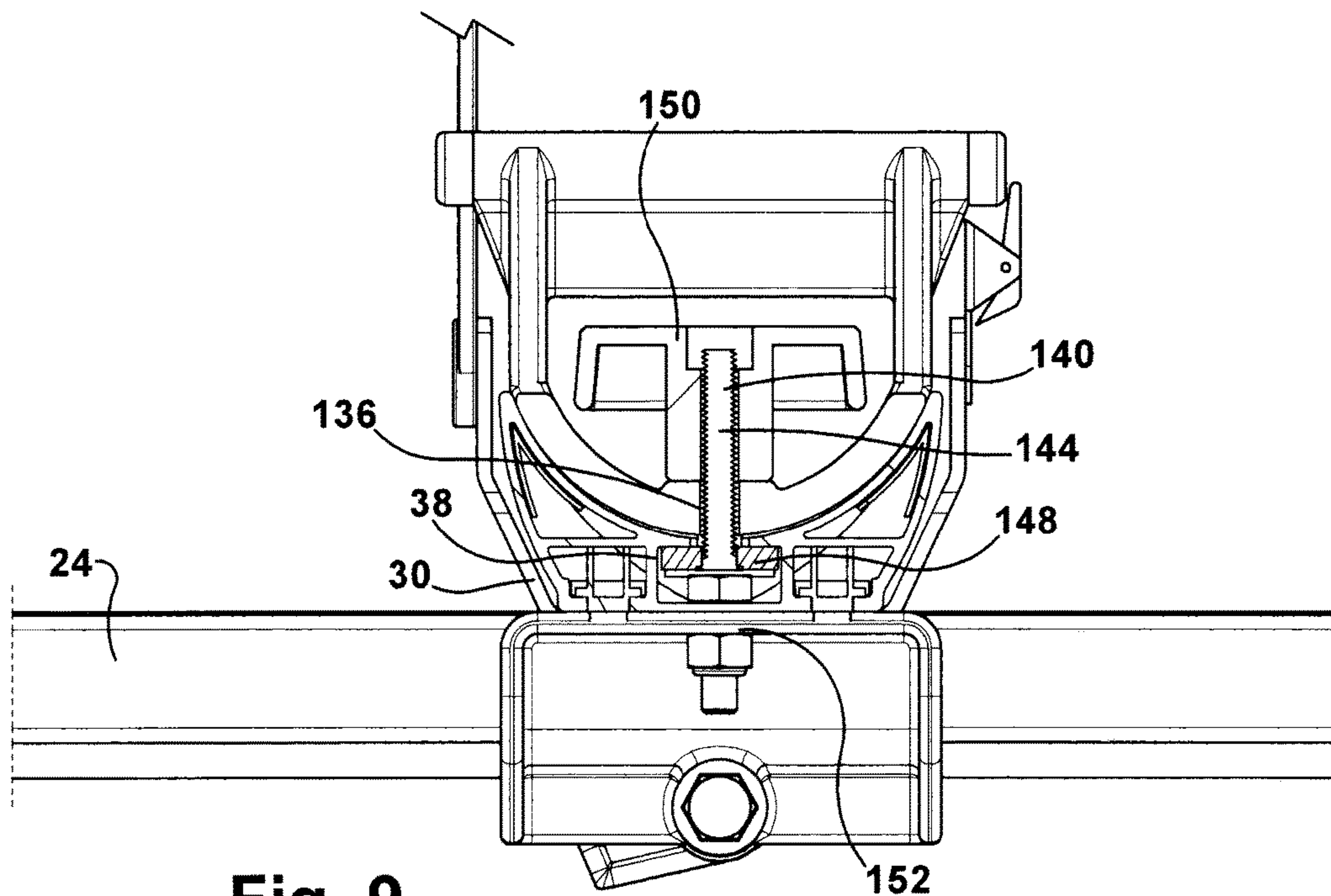


Fig. 9

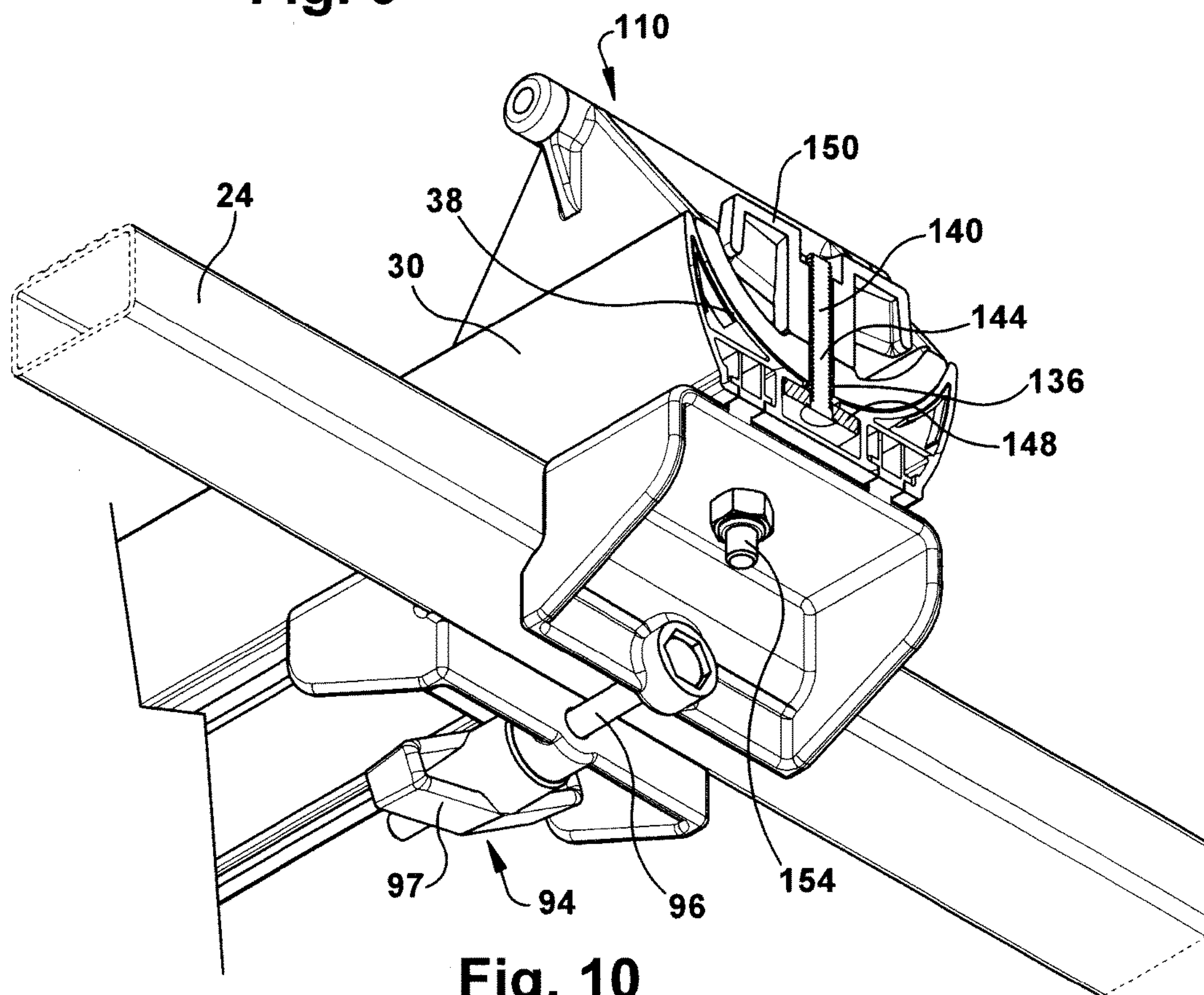


Fig. 10

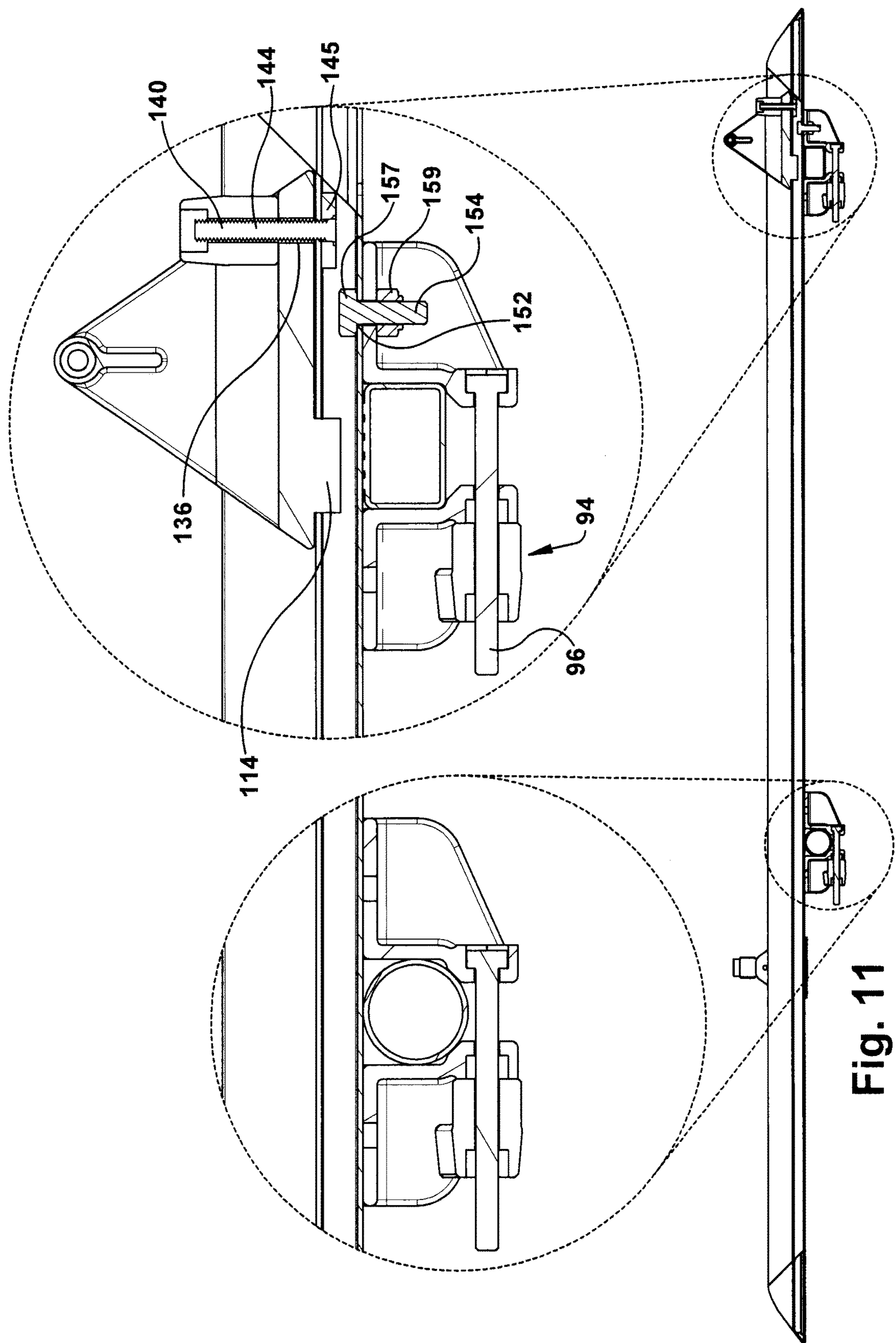
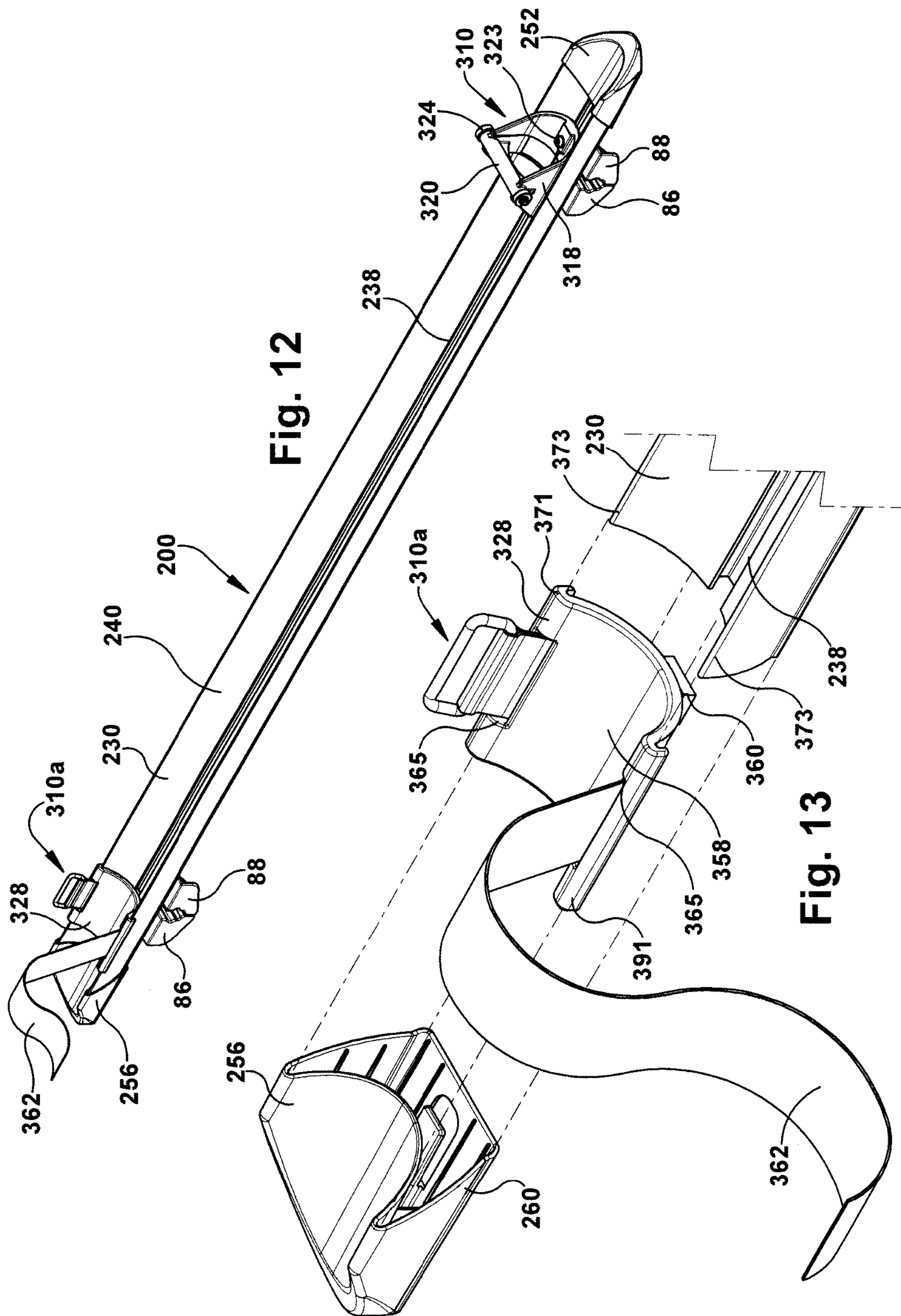
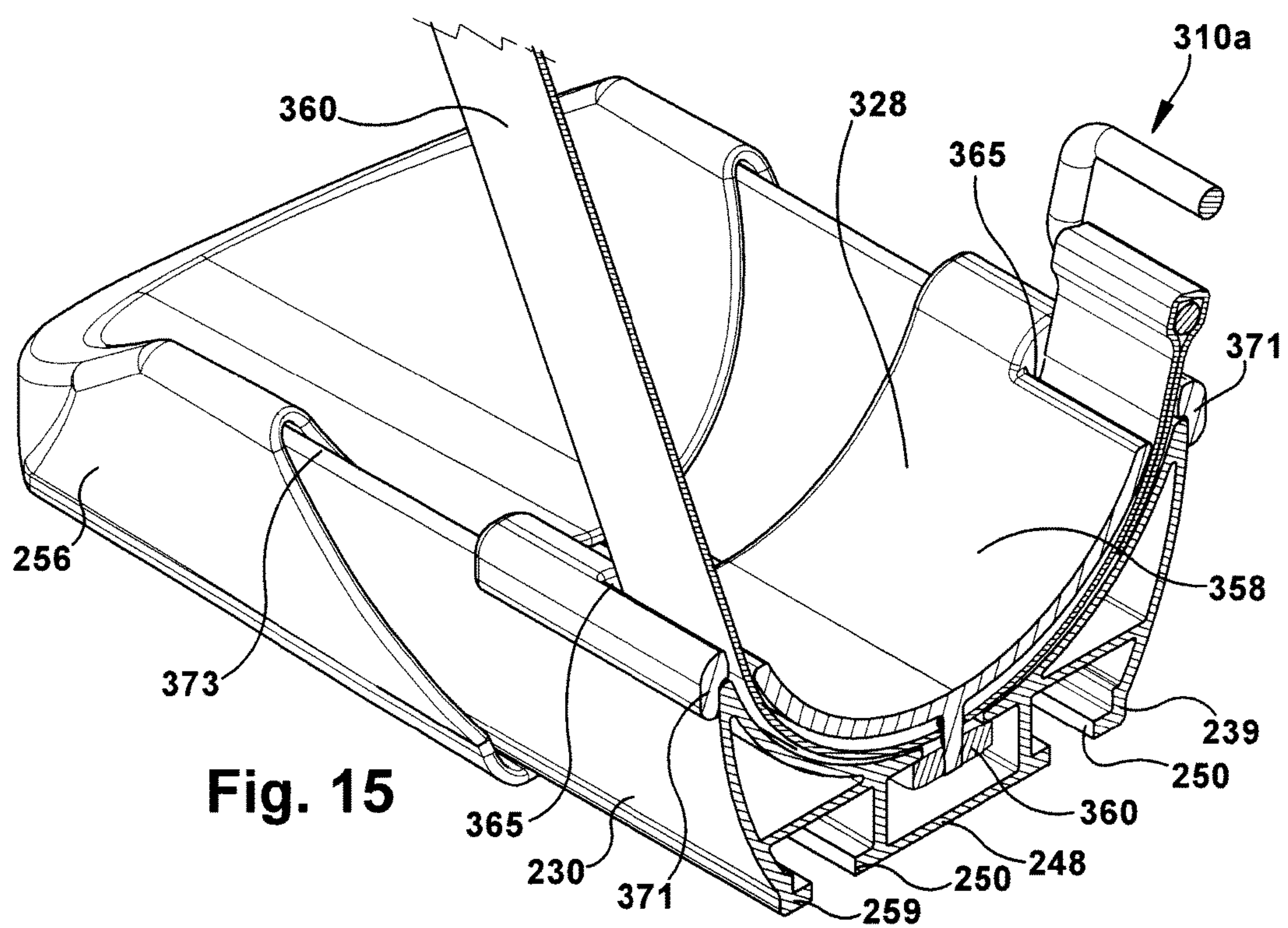
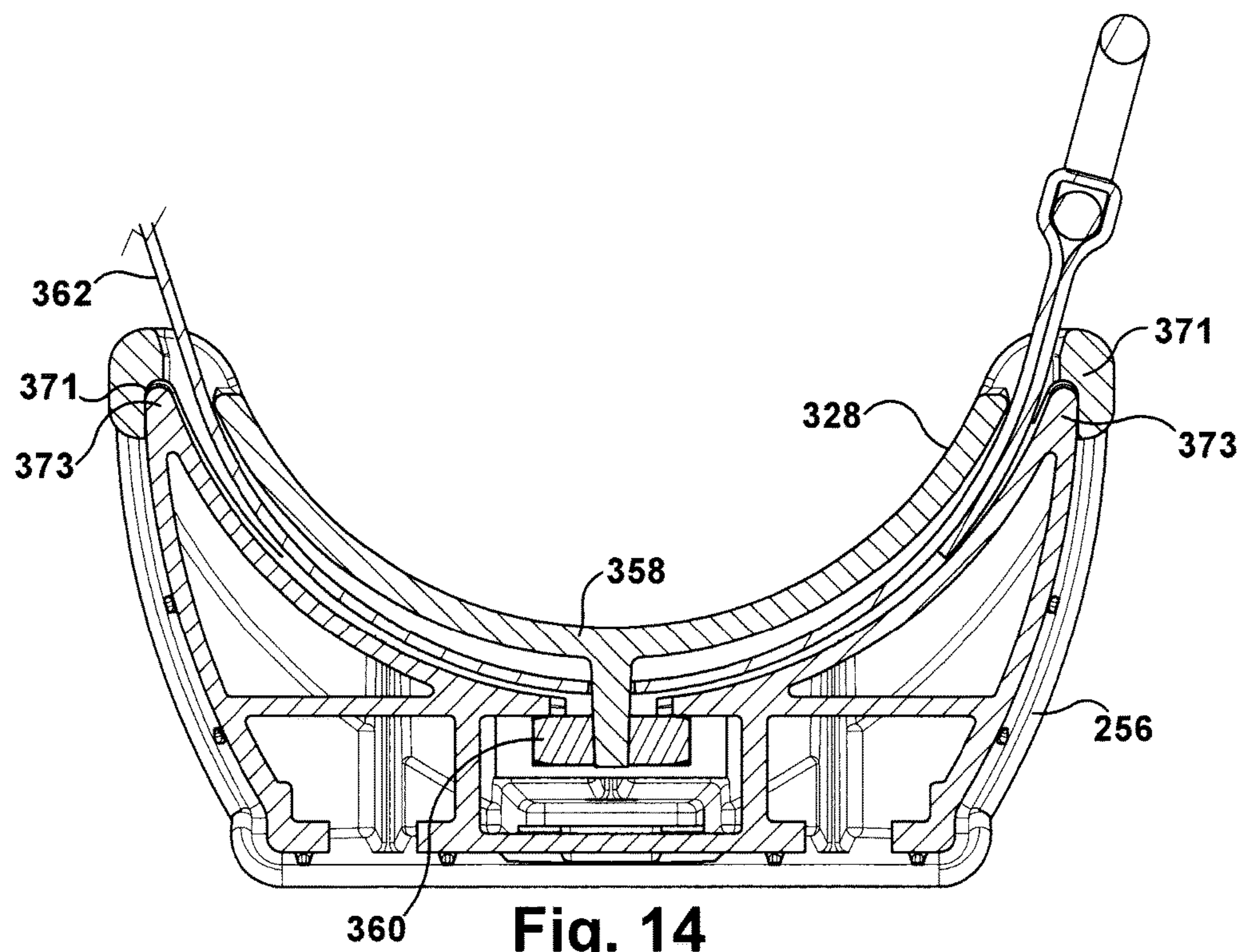


Fig. 11





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CARGO ACCESSORY MODULAR ADAPTER**CROSS-REFERENCE TO RELATED APPLICATION**

This application is a continuation-in-part of International Application No.: PCT/US2012/049521U.S., entitled "Cargo Accessory Modular Adapter" filed on Aug. 3, 2012, which claims the benefit from U.S. Provisional Patent Application No. 61/515,693 entitled "Cargo Accessory Modular Adapter" filed on Aug. 5, 2011, both of which are hereby incorporated in their entirety by reference.

TECHNICAL FIELD

The present invention generally relates to a cargo carrying accessory and, more particularly, to a cargo carrying accessory modular adapter and assembly.

BACKGROUND

Vehicles are available in many different shapes and sizes. Vehicles, regardless of their shape or size have a limit on the amount of cargo space available within the vehicle. In order to expand upon this limited cargo space, cargo management systems have been developed to help create additional cargo capacity for a vehicle. These cargo management systems are typically capable of carrying additional items in a predetermined manner, relieving vehicles of some of their cargo restraints.

Many of the available cargo management systems attach to the exterior of the vehicle and carry items outside of the vehicle. For example, there are cargo management systems that attach to roofs of vehicles, on luggage racks, in the load bed of a vehicle, and the like—each of which may carry items on the exterior of the vehicle.

However, installing and uninstalling cargo management systems from vehicles can often be time consuming and difficult. Still further, such cargo management systems are inflexible and provide little to no modularity. The lack of modularity and flexibility make it difficult to attach to the vehicle, limits the available uses of the system, and makes it difficult to store when not in use. Therefore, there is a need for a more modular and flexible cargo management system that may be capable of attaching to different kinds of vehicles, different kinds of attachment systems, and provides the ability to attach different kinds, shapes, and sizes of items.

DESCRIPTION OF THE DRAWINGS

The operation of the invention may be better understood by reference to the following detailed description taken in connection with the following illustrations, wherein:

FIG. 1 is a perspective view of a cargo mounting system attached to a portion of a roof rack of a vehicle with a bike attached thereto.

FIG. 2 is a perspective view of the cargo mounting system attached to a portion of a roof rack of a vehicle.

FIG. 3 is a bottom perspective view of the cargo mounting system.

FIG. 4 is a partially exploded view of the cargo mounting system.

FIG. 5 is a bottom view of the cargo mounting system.

FIG. 6 is a plan view of the cargo mounting system.

FIG. 7 is a side partial cross-sectional view of the cargo mounting system.

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FIG. 8 is a bottom perspective and partial cross-sectional view of the cargo mounting system.

FIG. 9 is a side partial cross-sectional view of the cargo mounting system in an alternative position.

FIG. 10 is a bottom perspective and partial cross-sectional view of the cargo mounting system in an alternative position.

FIG. 11 is a magnified cross-sectional side view of the cargo mounting system.

FIG. 12 is a perspective view embodiments of a cargo mounting system.

FIG. 13 is a partially exploded view of the cargo mounting system of FIG. 12.

FIG. 14 is a cross sectional view of the cargo mounting system along line 14 of FIG. 12.

FIG. 15 is a cross-sectional view of an end portion of the cargo mounting system of FIG. 12.

SUMMARY

A cargo mounting system is shown and described. The cargo mounting system may include a rail having first and second portions and a length, the first portion being opposite the second portion, a first engaging member positioned on the first portion of the rail, and a second engaging member positioned on the second portion of the rail. The cargo mounting system may also include at least one vehicle attaching member selectively attached to and positionable on the second engaging member of the rail, the at least one vehicle attaching member selectively attachable to a vehicle, and at least one accessory mounting member selectively attached to and positionable on at least one of the first and second engaging members, where the at least one accessory mounting member is capable of carrying an item.

A cargo mounting system may include a rail having first and second portions and a length, and at least one engaging member positioned on the rail between the first and second end portions, the at least one engaging member having an engaging member length. The cargo mounting system may include an accessory mounting member selectively securable on the at least one engaging member at any location along the engaging member length.

A cargo mounting system may include a rail having first and second portions and a length, and at least one engaging member positioned on the rail between the first and second end portions, the at least one engaging member having an engaging member length. The cargo mounting system may also include at least one clamping assembly selectively securable on the at least one engaging member at any location along the engaging member length, where the at least one clamping assembly is selectively securable to a plurality of different shaped roof rails.

DETAILED DESCRIPTION

Reference will now be made in detail to exemplary embodiments of the present invention, examples of which are illustrated in the accompanying drawings. It is to be understood that other embodiments may be utilized and structural and functional changes may be made without departing from the respective scope of the invention. Moreover, features of the various embodiments may be combined or altered without departing from the scope of the invention. As such, the following description is presented by way of illustration only and should not limit in any way the various

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alternatives and modifications that may be made to the illustrated embodiments and still be within the spirit and scope of the invention.

A cargo mounting system **20** is shown in FIGS. **1-11**. The cargo mounting system may be capable of attaching to a vehicle **22** in any appropriate manner, an example of which is shown in FIGS. **1** and **2**. The cargo mounting system **20** may be used to attach a variety of accessories to the vehicle **22**. By way of a non-limiting example, the cargo mounting system **20** may be selectively attached to a roof rack cross bar **24** of the vehicle **22** as described in more detail below. The cargo mounting system **20** may be capable of securing items and accessories in any appropriate location on the vehicle **22**, such as by way of a non-limiting example, to a roof **26** of the vehicle **22**. It should be understood, however, that the present teachings should not be limited to the cargo mounting system **20** being selectively attached to the roof rack **26** of the vehicle **22** as shown in FIGS. **1** and **2**. The cargo mounting system **20** may be selectively attached to any appropriate portion of the vehicle **22** or to any appropriate vehicle mounting assembly, including, without limitation a hitch receiver, a trunk rack, a load bed and the like.

The cargo mounting system **20** may include a rail **30** that may be selectively attachable to the vehicle **22**, such as by way of a non-limiting example to the roof **26** of the vehicle **22**. While a single rail **30** is shown in the drawings, the cargo mounting system **20** may include any number of rails **30**, such as by way of non-limiting examples, the cargo mounting system **20** may include a pair of rails **30**, three rails, four rails or the like. The present teachings are not limited to any specific number of rails **30**. The appropriate number of rails **30** to be used with the cargo mounting system **20** may depend upon the particular use of the cargo mounting system **20**, e.g., the location it is to be mounted on the vehicle **22**, the items which may be secured to the cargo mounting system **20** and the like.

The rails **30** of the cargo mounting system **20** may include at least one engaging member **38** positioned thereon. The engaging member **38** may be of any appropriate size and shape. By way of non-limiting examples, the engaging member **38** may include tracks, channels, slots, or any combination of such positioned in the rails **30**. The engaging member **38** may allow assemblies to secure the cargo mounting system **20** to the vehicle **22**, such as to the roof cross bars **24**, and may allow mounting accessories to be selectively attached to the engaging member **38**. The engaging member **38** may allow for modularity for the cargo mounting system **20** between the accessory components for the roof **26**, cargo carriers and mounting points on the vehicle **22** as may be described in further detail below. It should be appreciated that the features, components, elements and functionalities of the various embodiments may be combined or altered to achieve a cargo mounting system **20** without departing from the spirit and scope of the present teachings.

In some embodiments, the rail **30** may include the first engaging member **38** and a second engaging member **39**, such as shown in the drawings. While two engaging members **38**, **39** are shown in the drawings, any number of engaging members may be used without departing from the present teachings. The first engaging member **38** may be a generally T-shaped slot **38** and may be located on a first portion **40** of the rail **30**, such as by way of a non-limiting example, the top portion **40** of the rail **30**. In some embodiments, the generally T-shaped slot **38** may extend the entire length of the rail **30**. In the alternative, the generally T-shaped slot **38** may only extend a portion of the length of

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the rail **30**. Additionally, while one generally T-shaped slot **38** is shown any number of slots may be used as the first engaging member **38**. Still further, while the slot **38** is shown and described as a generally T-shaped slot, it is not limited to such. The slot **38** may be of any appropriate shape and size, e.g., dovetail, L-shaped, C-shaped, or any other appropriate shape.

The second engaging member **39** may be located on a second portion **48** of the rail **30**, such as by way of a non-limiting example, on the bottom portion **48** of the rail **30**. The second engaging member **39** may be of any appropriate shape and size. In some embodiments, the first and second engaging members **38**, **39** may be of substantially similar construction. In addition, in some embodiments the first and second engaging members **38**, **39** may be of generally different construction. The present teachings are not limited to such. The second engaging member **39** may include a pair of generally T-shaped slots **50**, as shown in more detail in FIGS. **3** and **5**. While two generally T-shaped slots **50** are shown any number of slots may be used for the second engaging member **39**. Moreover, while the slots **50** are shown and described as generally T-shaped slots, they are not limited to such. The slots **50** may be of any appropriate shape and size, e.g., dovetail, L-shaped, C-shaped, or any other appropriate shape. Still further, while the slots **50** are shown as being generally similar, the present teachings are not limited to such. One of the pair of slots **50** may have a first shape and size and the other of the pair of slots **50** may be of a different shape and size. Still further, the pair of generally T-shaped slots **50** may extend the entire length of the rail **30**. In the alternative, the generally T-shaped slots **50** may only extend a portion of the length of the rail **30**.

The rail **30** may further include a first end portion **52** and a second end portion **56** that may be capable of selectively and/or fixedly attaching to the rail **30**. In some embodiments, the first and second end portions **52**, **56** may each include engaging devices **60**, **64** that may be capable of engaging with the second engaging member **39**. By way of a non-limiting example, the engaging devices **60**, **64** may include male generally T-shaped member **60**, **64**, which may both be capable of selectively engaging the pair of generally T-shaped slots **50** of the rail **30**. In addition, the first and second end portions **52**, **56** may be of a generally same profile and shape as that of the rail **30** such that when attached the combination thereof has a generally continuous shape. This may allow the first and second end portions **52**, **56** to be selectively attachable to the rail **30**. Still further, the first end portion **52** may include a front portion that has a generally aerodynamic shape and the second end portion **56** may have an end portion that may generally create a terminus end. This may form a rail **30** that has an aerodynamic front portion such that when it is placed on the roof **26** of the vehicle **22** it may provide good aerodynamic characteristics. The terminus end **56** may provide a rail **30** that has a clear end portion. The rails **30** may be made of any appropriate material, such as by way of non-limiting examples, being made from stereolithography (SLA) plastic with first and second engaging members **38**, **39** being made from an appropriate material such as aluminum extrusion. However, the present teachings are not limited to the specific material, the rail **30** and its components may be made from any appropriate materials, e.g., metals, plastics, rubber or any combination of such.

The cargo mounting system **20** may include at least one vehicle attachment assembly **80** that may be capable of selectively securing the cargo mounting system **20** to the

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vehicle 22. In some embodiments, the vehicle attachment assembly may be capable of selectively securing the cargo mounting system 20 and more specifically, the rail 30 to the roof 26 of the vehicle 22. The vehicle attachment assembly 80 may be capable of selectively securing the rail 30 to the roof rack cross bars 24 of the vehicle 22.

The vehicle attachment assembly 80 may include a first clamping member 86 and a second clamping member 88. The first clamping member 86 may be selectively attached to the second clamping member 88 such that a portion of the roof rack cross bars 26 may be capable of being wedgingly engaged therebetween. The engagement of the first clamping member 86 and the second clamping member 88 may create a channel 90 into which the roof rack cross bar 26 may be capable of wedgingly fitting. By way of a non-limiting example, as shown in FIGS. 3 and 8, the channel 90 may be formed upon the engagement of the first and second clamping members 86, 88 to be of a shape and size to secure the vehicle attachment assembly 80 to either of a roof rack cross bar 26 that is of a generally rectangular or circular cross-sectional shape. Further, the channel 90 may be of a shape and size to secure the vehicle attachment assembly 80 to any appropriately shaped and sized roof rack cross bar 26, not just the shape shown, including, without limitation, generally square, triangular, or oval shapes or any combination of such.

The vehicle attachment assembly 80 may further include a fastener 94, such as by way of a non-limiting example a bolt 96 with a winged nut 97. The winged nut 97 may make gripping easier for the user. The fastener 94 may be any appropriate fastener, not just that shown and described herein. Further still, the fastener 94 may not include the winged nut 97. Once the first and second clamping members 86, 88 are appropriately aligned such that the roof rack cross bar 24 is positioned within the channel 90, the fastener 94 may be tightened until the first and second clamping members 86, 88 clampingly engage the roof rack cross bar 24. The first and second clamping members 86, 88 may apply sufficient force to generally hold the first and second clamping members 86, 88 together. In some embodiments, the winged nut 97 may be threaded on to the fastener 94 to engage the first and second clamping members 86, 88 together.

The first and second clamping members 86, 88 may each include an aperture 98, 99, respectively, that may be appropriately shaped and sized such that the fastener 94 may pass therethrough. This may permit the fastener 94 and the winged nut 97 threaded thereon to wedgingly engage the first and second clamping members 86, 88 together to create sufficient clamping force such that the cargo mounting system 20 may be secured to the roof rails 24 of the vehicle 22.

The vehicle attachment assembly 80 may further include a male engaging member 100 that may be capable of selectively and slidably engaging the second engaging member 39, which may be positioned on the second or bottom portion 48 of the rail 30. The male engaging member 100 may have a shape and size such that it may engage with the second engaging member 39. It should be understood, however, that while the male engaging member 100 is shown and described as a male member and the second engaging member 39 is shown and described a female engaging member, the present teachings are not limited to such. The engaging member 100 may be a female engaging member and the second engaging member 39 may be a corresponding male engaging member. Still further, while the male engaging member 100 is shown and describe as

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have a shape and size corresponding to the second engaging member 39, it may also have a shape and size that may correspond to the first engaging member 38—the first and second engaging members 38, 39 may have generally the same shape and size or different shape and size.

In some embodiments, the first and second clamping members 86, 88 may each include generally T-shaped male members 100 that may be capable of selectively and slidably engaging the second engaging member 39. While a generally T-shaped male member 100 is shown, any appropriate shaped member may be used such that it may correspond to the shape and size of the second engaging member 39 of the rail 30. This may result in the clamping members 86, 88 being capable of engaging and being selectively positioned along the length of the rail 30 and in particularly along the length of the second engaging member 39 such as through sliding.

In these embodiments, the first and second clamping members 86, 88 may be slidably engaged with the slots 50 on the bottom portion 48 of the rail 30 so as to position the rail 30 on an appropriate position on the vehicle 22. By way of a non-limiting example, the male engaging members 100 may have a generally I-shaped cross-section that corresponds to the generally shaped slot 50 such that the male engaging members 100 may be capable of engaging and sliding along the slot 50. Specifically, the male engaging members 100 of the first and second clamping members 86, 88 may be slid onto the slots 50 and appropriately positioned along any appropriate portion on the length of the roof rack cross bars 24. The position of which may depend upon the particular use of the cargo mounting system 20, the vehicle 22 to which it is attached, the type and location of the roof bars 24 and the like.

The cargo mounting system 20 may further include at least one accessory adapter bracket 110 that may be capable of attaching to the rail 30. While the drawings show two such accessory adapter brackets 110 being used, any number of accessory adapter brackets 110 may be used depending upon the appropriate use thereof. In addition, while the accessory adapter brackets 110 are shown as being a bike rack, the present teachings are not limited to such and can be any kind of adapter brackets 110, including, without limitation a ski rack, boat rack, surf board rack, or the like. Still further, multiple of accessory adapter brackets 110 may be attached, e.g., a pair of accessory adapter brackets 110 capable of holding a bicycle and an accessory adapter bracket 110 that may be capable of holding a ski may be used. Any combination of such can be used. The present teachings are not limited to a specific configuration.

The accessory adapter brackets 110 may allow accessories or items to be to be mounted to the rail 30, such as by way of a non-limiting example a bicycle, such as shown in FIG. 1. The adapter brackets 110 may include an engaging device 114 that may be capable of slidably attaching to the rails 30 and to be selectively positionable along the length of the rail 30. The engaging device 114 may be of a shape and size such that it may be capable of engaging the first engaging member 38 and being selectively positioned thereon, or more particularly being selectively positionable along the length of the first engaging member 38. It should be understood, however, that while the engaging device 114 is shown and described as a male member and the first engaging member 38 is shown and described a female engaging member, the present teachings are not limited to such. The engaging device 114 may be a female engaging member and the first engaging member 38 may be a corresponding male engaging member. Still further, while the engaging device 114 is

shown and described as have a shape and size corresponding to the first engaging member **38**, it may also have a shape and size that may correspond to the second engaging member **39**.

Further, the accessory adapter brackets **110** may include an accessory adapter body **118** to which an accessory or item may be capable of attaching. The accessory adapter body **118** may extend in a generally opposite direction to the engaging device **114** such that it may extend away from the rail **30**. The accessory adapter body **118** may include an accessory attaching device **120**. As shown in the drawings, the accessory attaching device **120** may be a bike-securing device **124** that may be capable of having selectively secured thereto a bicycle. Still further, the cargo mounting system **20** may include a second accessory adapter bracket **110a** that may correspond to the bike-securing device **120**. In such embodiments, the second accessory adapter bracket **110a** may be selectively securable to the second engaging member **39** so that it may be positioned on the second portion **48** of the rail. The second accessory adapter bracket **110a** may include a strap member **128** that may be capable of securing the bicycle to the rail **30**. In such embodiments, the accessory attaching device **120** may secure a front portion of the bicycle and the strap member **128** may secure a rear portion of the bicycle to the rail **30**.

While the bike-securing device **124** and strap member **128** are shown, any kind of accessory attaching device **120** may be used, and the present teachings are not limited to any specific kind of accessory attaching device **120**. In these embodiments, the bike-securing device **124** may include a male engaging member **132** that may be capable of slidably engaging the first engaging member **38** of the rail **30**. By way of a non-limiting example, the male engaging member **132** may be generally male T-shaped member that may be correspondingly shaped and sized with the first engaging member **38**. This may allow the accessory attaching device **120**, and more specifically, the bike-securing device **124** to be selectively slidable along the entire length of the first engaging member **38**, or alternatively along a portion of the length of the first engaging member **38**. It should be understood, however, that while male member **132** is shown and described as a male member and the first engaging member **38** is shown and described a female engaging member, the present teachings are not limited to such. The member **132** may be a female engaging member and the first engaging member **38** may be a corresponding male engaging member. Still further, while the member **132** is shown and described as having a shape and size corresponding to the first engaging member **38**, it may also have a shape and size that may correspond to the second engaging member **39**.

In some embodiments, the bike rack body **124** may also include an aperture **136** through which a fastener **140** may engage to further secure the bike-securing device **124** to the rail **30**. In such embodiments, the fastener **140** may include a threaded body **144**, a head **148** and a winged nut **150**. The head **148** may be shaped and sized to slidably fit within the first engaging member **38**. Once the head **148** is selectively engaged with the first engaging member **38**, the winged nut **150** may then be threaded onto the threaded body **144** to further wedgingly engage the bike-securing device **124** to the rail **30**.

In some embodiments, the first and second clamping members **86, 88** may include an aperture **152** through which a fastener **154** may pass and engage the rail **30**. In other embodiments, only one of the first or second clamping members **86, 88** may include an aperture **152** through which the fastener **154** may pass and engage the rail **30**. This

fastener **154** may further secure the first and second clamping members **86, 88** to the rail **30**, or may secure one of the first and second clamping members **86, 88** to the rail **30**. The fastener **154** may include a head **157**, such as shown in more detail in FIG. **11**. The head **154** may be shaped and sized to engage at least a portion of the second engaging member **39**—or more specifically, slidably engage at least one of the slots **50**—such that it may selectively engage the first and/or second clamping members **86, 88** to the rail **30**. A nut **159** may be capable of engaging the fastener **154** and may be tightened on the fastener **154**, which may selectively secure the first and/or second clamping members **86, 88** to the rail **30**. Still further, in some embodiments, the rail **30** may include an aperture (not shown) through which the fastener **154** may pass to selectively secure the first and/or second clamping members **86, 88** to the rail **30**.

The strap member **128** may include a body **158** that may include a male engaging member (not shown) that may be capable of slidably engaging the first engaging member **38** of the rail **30**. By way of a non-limiting example, the male engaging member may be a generally male T-shaped member that may be correspondingly shaped and sized with the first engaging member **38**. This may allow the strap member **128** to be selectively slidable along the entire length of the first engaging member **38**, or alternatively along a portion of the length of the first engaging member **38**. It should be understood, however, that while male engaging member is described as a male member and the first engaging member **38** is shown and described a female engaging member, the present teachings are not limited to such. The member may be a female engaging member and the first engaging member **38** may be a corresponding male engaging member. Still further, while the member is described as having a shape and size corresponding to the first engaging member **38**, it may also have a shape and size that may correspond to the second engaging member **39**. In such embodiments, the strap member **128** may be selectively positionable along a length of the second engaging member **39**. The strap member **128** may include a strap **162** that may be capable of engaging a bike that may be attached to the cargo mounting system **20** such that the bike may be secured thereto. The strap **162** may be of a shape and size such that it may be capable of securing around a bicycle tire.

The accessory adapter bracket **110**, the vehicle attachment assembly **80** and accessory adapter body **118** may be made of any appropriate material. By way of a non-limiting example, the accessory adapter bracket **110**, the vehicle attachment assembly **80** and accessory adapter body **118** may be produced using glass filled nylon, extruded aluminum, die cast aluminum, steel, or steel casting. Specifically, the accessory adapter body **118** may be produced from die cast aluminum, and the first and second clamping bodies **86, 88** from glass filled nylon. However, the present teachings are not limited to a specified material. Any appropriate material may be utilized without departing from the present teachings.

In operation, the cargo mounting system **20** may allow accessories or items to mount to the vehicle **22**, including to the vehicle roof **26**. Further, the cargo mounting system **20** may provide the adjustability to work on multiple vehicles and work with multiple styles of accessories and items. By way of a non-limiting example, the cargo mounting system **20** may be attached to a vehicle **22** in accordance with the following—however, the present teachings are not limited to such. The generally T-shaped male members **100** of the first and second clamping members **86, 88** may slidably engage the second engaging member **39** or more particularly, the

slots **50**. Next, the first and second clamping members **86, 88** may be clamped around the roof rack bars **24** and may be secured together to wedgingly engage the roof rack cross bars **24**. The channel **90** formed from the first and second clamping members **86, 88** may be of an appropriate size to wedgingly fit the roof bars **24** therein. The channel **90** may be of a shape such that it may be capable of wedgingly fitting with roof bars of various shapes and sizes, such as a generally circular cross-sectional shaped roof bar **24** and a generally rectangular cross-sectional shaped roof bar **24**.

The accessory adapter bracket **110** may then be slidably engaged with the first engaging member **38** of the rail **30**. The accessory adapter bracket **110** may be slidably positioned to the appropriate position, which may depend upon the type and style of the accessory adapter bracket **110**. In some embodiments, the male member **132** of the bike-securing device **124** may selectively engage the first engaging member **38** and may be slid into place. Similarly, the head **148** of the fastener **140** may be slid into the first engaging member **38** and the winged nut **150** may be tightened further securing the bike-securing device **124** to the first engaging member **38**. If appropriate, the strap member **128** may be selectively engaged with the second engaging member **39**. Particularly, the male member may selectively engage the second engaging member **39** and may be positioned into the appropriate location along the rail **30**. Once complete the applicable item or accessory to be carried by the cargo mounting system **20**, such as by way of a non-limiting example, a bicycle may be mounted to the cargo mounting system **20**. A portion of the bicycle may be selectively secured to the bike-securing device **124** and the strap **162** of the strap member **128** may selectively engage a rear tire of the bicycle.

The order of attachment of the components of the cargo mounting system **20** set forth above are not limited to the steps described above. Steps may be done in a different order and steps may be skipped and additional steps may be added without departing from the present teachings.

Additional embodiments of a cargo mounting system according the present teachings are described below. In the descriptions, all of the details and components may not be fully described or shown. Rather, the features or components are described and, in some instances, differences with the above-described embodiments may be pointed out. Moreover, it should be appreciated that these additional embodiments may include elements or components utilized in the above-described embodiments although not shown or described. Thus, the descriptions of these additional embodiments are merely exemplary and not all-inclusive nor exclusive. Moreover, it should be appreciated that the features, components, elements and functionalities of the various embodiments may be combined or altered to achieve a desired cargo mounting system without departing from the spirit and scope of the present teachings.

Embodiments of a cargo mounting system **200** may include a rail **230** that may be selectively attachable to the vehicle **22**, such as by way of a non-limiting example to the roof **26** of the vehicle **22**. While a single rail **230** is shown in the drawings, the cargo mounting system **200** may include any number of rails **230**. The rails **230** may include at least one engaging member **238** positioned thereon. The engaging member **238** may be of any appropriate size and shape. In some embodiments, the rail **230** may include the first engaging member **238** and a second engaging member **239**, such as shown in the drawings. While two engaging mem-

bers **238, 239** are shown in the drawings, any number of engaging members may be used without departing from the present teachings.

The first engaging member **238** may be a generally T-shaped slot **238** and may be located on a first portion **240** of the rail **230**, such as by way of a non-limiting example, the top portion **240** of the rail **230**. In some embodiments, the generally T-shaped slot **238** may extend the entire length of the rail **230**. In the alternative, the generally T-shaped slot **238** may only extend a portion of the length of the rail **230**. Additionally, while one generally T-shaped slot **238** is shown any number of slots may be used as the first engaging member **238**. Still further, while the slot **238** is shown and described as a generally T-shaped slot, it is not limited to such. The slot **238** may be of any appropriate shape and size, e.g., dovetail, L-shaped, C-shaped, or any other appropriate shape.

The second engaging member **239** may be located on a second portion **248** of the rail **230**, such as by way of a non-limiting example, on the bottom portion **248** of the rail **230**. The second engaging member **239** may be of any appropriate shape and size. In some embodiments, the first and second engaging members **238, 239** may be of substantially similar construction. In addition, in some embodiments the first and second engaging members **238, 239** may be of generally different construction. The present teachings are not limited to such. The second engaging member **239** may include a pair of generally T-shaped slots **250**, as shown in more detail in FIG. **15**. While two generally T-shaped slots **250** are shown any number may be used for the second engaging member **239**. Moreover, while the slots **250** are shown and described as generally T-shaped slots, they are not limited to such. The slots **250** may be of any appropriate shape and size, e.g., dovetail, L-shaped, C-shaped, or any other appropriate shape. Still further, while the slots **250** are shown as being generally similar, the present teachings are not limited to such. One of the pair of slots **250** may have a first shape and size and the other of the pair of slots **250** may be of a different shape and size. Still further, the pair of generally T-shaped slots **250** may extend the entire length of the rail **230**. In the alternative, the generally T-shaped slots **250** may only extend a portion of the length of the rail **230**.

The rail **230** may further include a first end portion **252** and a second end portion **256** that may be capable of selectively and/or fixedly attaching to the rail **230**. In some embodiments, the first and/or second end portions **252, 256** may include an opening **261** such that the rail **230** may be inserted therein. This may result in the first and/or second end portions **252, 256** generally circumscribing the rail **230** when attached thereto. The first and/or second end portions **252, 256** may further include an engaging member **263** configured to operatively engage with either of the first or second engaging members **238, 239**. By way of a non-limiting example, the engaging member **263** may be configured to operatively engage with the slot **238** as shown in FIG. **13**. In addition, the first and second end portions **252, 256** may be of a generally same profile and shape as that of the rail **230** such that when attached the combination thereof has a generally continuous shape. This may allow the first and second end portions **252, 256** to be selectively attachable to the rail **230**. Still further, the first end portion **252** may include a front portion that has a generally aerodynamic shape and the second end portion **256** may have an end portion that may generally create a terminus end. This may form a rail **230** that has an aerodynamic front portion such that when it is placed on the roof **26** of the vehicle **22** it may

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provide good aerodynamic characteristics. The terminus end **256** may provide a rail **230** that has a clear end portion.

The cargo mounting system **200** may further include at least one accessory adapter bracket **310** that may be capable of attaching to the rail **230**. While the drawings show two such accessory adapter brackets **310**, **310a** being used, any number of accessory adapter brackets **310** may be used depending upon the appropriate use thereof. In addition, while the accessory adapter brackets **310**, **310a** are shown as being a bike rack, the present teachings are not limited to such and can be any kind of adapter brackets **310**, **310a**, including, without limitation a ski rack, boat rack, surf board rack, or the like.

The accessory adapter brackets **310**, **310a** may allow accessories or items to be mounted to the rail **230**. In some embodiments, the adapter brackets **310**, **310a** may be configured to operatively engage the rails **230** and to be selectively positionable along at least a portion or all of the length of the rail **230**. In some embodiments, one of the adapter brackets **310** may be fixed while the other of the adapter brackets **310a** may be configured to be selectively positionable along at least a portion of the length or all of the length of the rail **230**.

As shown in FIG. 12, the first adapter bracket **310** may include an accessory adapter body **318** to which an accessory or item may attach. The accessory adapter body **318** may extend away from the rail **230**. The accessory adapter body **318** may include an accessory attaching device **320**. As shown in FIG. 12, the accessory attaching device **320** may be a bike-securing device **324** that may selectively secure thereto a bicycle. As shown in FIG. 12, the first adapter bracket **310** may include a fastener **323** that may secure the first adapter bracket **310** in an operative position on the rail **230**. Once the fastener **323** is tightened onto the first adapter bracket **310**, either of the first or second clamping members **86**, **88** may be fixed relative to the rail **230**. Loosening the fastener **323** may permit the first adapter bracket **310** to be selectively positionable along the slot **238** and either of the first and second clamping members **86**, **88** being moveable along the second engaging member **239**.

The second adapter bracket **310a** may correspond to the bike-securing device **320**. In such embodiments, the second adapter bracket **310a** may be selectively securable to the first engaging member **238** of the rail **230**. The second adapter bracket **310a** may include a strap member **328** that may be capable of securing the bicycle to the rail **230**. In such embodiments, the accessory attaching device **320** may secure a front portion of the bicycle and the strap member **328** may secure a rear portion of the bicycle to the rail **230**.

The strap member **328** may include a body **358** that may include a male engaging member **360** that may slidably engage the first engaging member **238** of the rail **230**. By way of a non-limiting example, the male engaging member **360** may be a generally male T-shaped member that may be correspondingly shaped and sized with the first engaging member **238**. This may allow the strap member **328** to be selectively slidable along the entire length of the first engaging member **238**, or alternatively along a portion of the length of the first engaging member **238**. It should be understood, however, that while male engaging member **360** is shown and described as a male member and the first engaging member **238** is shown and described as a female engaging member, the present teachings are not limited to such. The member **360** may be a female engaging member and the first engaging member **238** may be a corresponding male engaging member. Still further, while the member **360** is shown and described as having a shape and size corre-

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sponding to the first engaging member **238**, it may also have a shape and size that may correspond to the second engaging member **239**.

The strap member **328** may further include a pair of apertures **365** configured to operatively attach a strap **362** to the strap member **328**. In such embodiments, the strap **362** may be inserted into and through the apertures **365** such that the strap **362** may engage a bike attached to the cargo mounting system **200**. By way of a non-limiting example, the strap **362** may be of a shape and size such that it may be secure around a bicycle tire.

The strap member **328** may further include a rail engaging member **371**. As shown in FIGS. 13-15, the strap member **328** may include a pair of rail engaging members **371**. It should be understood, however, that any number of rail engaging members **371** may be used. The rail engaging members **371** may be configured to slidably engage end portions **373** of the rail **230** as shown in FIG. 13. The rail engaging members **371** may slide onto the end portions **373** of the rail **230**. The rail engaging members **371** may maintain contact between the strap member **328** and the rail **230**. The rail engaging members **371** may generally prevent the strap member **328** from being pulled away from the rail **230**. Further still, the rail engaging members **371** may keep the strap members **328** in their operative position relative to the rail **230**. The rail engaging member **371** and the male engaging member **360** may keep the strap member **328** operatively engaged with the rail **230**. This may be especially useful when a user applies an upward force on the strap **362** while engaging the bicycle tire. In the embodiments shown, the rail engaging member **371** and the male engaging member **360** may provide at least three points of engagement preventing the strap member **328** from being pulled away from the rail **230** maintaining its operative position.

Although the embodiments of the present invention have been illustrated in the accompanying drawings and described in the foregoing detailed description, it is to be understood that the present invention is not to be limited to just the embodiments disclosed, but that the invention described herein is capable of numerous rearrangements, modifications and substitutions without departing from the scope of the claims hereafter. The claims as follows are intended to include all modifications and alterations insofar as they come within the scope of the claims or the equivalent thereof.

Having thus described the invention, the following is claimed:

1. A cargo mounting system comprising:
 - a rail having a top, a bottom, and a length;
 - a first engaging member positioned on the top of the rail;
 - a second engaging member positioned on the bottom of the rail;
 - a first clamping device selectively positioned on and moveable with respect to the second engaging member along the bottom of the rail,
 - a second clamping device selectively positioned on and moveable with respect to the second engaging member along the bottom of the rail, the second clamping device moveable independent of the first clamping device, wherein the first and second clamping devices are configured to engage a roof rail of a vehicle operatively securing the rail to the vehicle;
 - a first accessory mounting member selectively positioned on and moveable with respect to the first engaging

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member along the top of the rail, wherein the first accessory mounting member is capable of engaging an item;

a second accessory mounting member selectively positioned on either the first or second engaging member; 5
and

a pair of end members selectively attached to either of the first or second engaging members,
wherein the rail further includes a curved wall extending upward from the first engaging member. 10

2. The cargo mounting system of claim 1, further comprising a fastener selectively attached to and engaging the first and second clamping devices together with the roof rail of the vehicle wedged between the first and second clamping devices selectively securing the rail to the roof rail of the vehicle. 15

3. The cargo mounting system of claim 1, wherein the first and second clamping devices are configured to vertically engage the roof rail.

4. The cargo mounting system of claim 1, wherein the first and second engaging members extend along a majority portion of the length of the rail. 20

5. The cargo mounting system of claim 4, wherein the first and second engaging members extend along an entirety of the length of the rail. 25

6. The cargo mounting system of claim 5, wherein the first and second clamping devices are moveable on the second engaging member along the entirety of the length of the rail.

7. The cargo mounting system of claim 5, wherein the first accessory mounting member is positionable on the first engaging member along the entirety of the length of the rail. 30

8. A cargo mounting system comprising:

a rail having first and second end portions and a length;
a first engaging member positioned on the rail between the first and second end portions; 35

a second engaging member positioned on the rail between the first end portion and the second end portion, opposite of the first engaging member;

a first accessory mounting member selectively securable on the rail by way of the first engaging member; 40

a second accessory mounting member engageable on the first or second engaging member;

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at least one vehicle attaching member selectively securable on the rail by way of the second engaging member, wherein the at least one vehicle attaching member includes first and second clamping members, the first clamping member positioned on and moveable with respect to the second engaging member and the second clamping member positioned on and moveable with respect to the second engaging member, the first clamping member moveable independent of the second clamping member; and

a pair of end members selectively attachable to either of the first or second engaging members,
wherein the rail further includes a curved wall extending upward from the first engaging member.

9. The cargo mounting system of claim 8, wherein the first and second clamping members are configured to vertically engage different shaped roof rails.

10. The cargo mounting system of claim 8, wherein the first and second engaging members each include one of a channel, track, or slot having a length and a corresponding male engaging member is slidably engaged thereto.

11. The cargo mounting system of claim 8, wherein at least one of the first and second engaging members comprise a channel, track, or slot having a second length, whereby the length is equal to the second length. 25

12. The cargo mounting system of claim 11, wherein the second engaging member is integrated with the rail so that the rail includes the channel, track, or slot and the vehicle attaching member includes corresponding male engaging members on each of the first and second clamping members. 30

13. The cargo mounting system of claim 12, wherein the rail includes a female generally T-shaped slot and each of the male engaging members is a generally T-shaped male member. 35

14. The cargo mounting system of claim 12, wherein the second accessory mounting member includes a second male engaging member whereby the second accessory mounting member is selectively and independently securable to the rail. 40

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